WHAT IS CLAIMED IS:

1. An etching method, in which a target object to be processed, which has an oxide film formed on the upper surface thereof, is held within a process chamber capable of maintaining a vacuum environment, and a plasma is generated in the etching gas atmosphere introduced into said process chamber so as to etch said oxide film formed on said target object within the plasma,

wherein said etching gas including a C_4F_6 gas and an O_2 gas, and a ratio C_4F_6/O_2 of the C_4F_6 gas to the O_2 gas falls within a range of 0.7 and 1.5.

2. The oxide film etching method according to claim 1, wherein said etching gas further contains an inert gas in addition to said C_4F_6 gas and said O_2 gas.

3. The oxide film etching method according to claim 1, wherein the gas pressure within said process chamber is set to fall within a range of 1.3 and 26 Pa (between 10 and 200 mTorr) in the etching step.

4. The method according to claim 1, wherein the total flow rate of the C_4F_6 gas and the O_2 gas into said process chamber is set to fall within a range of 0.01 and 0.1 L/min in the etching step.

5. The method according to claim 1, wherein the residence time of O_4F_6 and O_2 ranges from 0.69 msec to 26.3 msec.

6. The method according to claim 1, wherein the

plasma density in the etching step is not lower than $3 \times 10^{10}/cm^3$ and is lower than $2 \times 10^{11}/cm^3$.

7. The method according to claim 1, wherein the temperature of said target object is set at 50℃ or higher in the etching step.

8. The method according to claim 1, wherein the silicon nitride film is exposed when the silicon oxide film is etched.

9. The method according to claim 8, wherein the silicon oxide film is etched in a self-alignment contact process.

10. The method according to claim 1, wherein said mechanism for generating a plasma is of a capacity coupled etching type, in which a high frequency electric field is formed between a pair of mutually facing electrodes for generating a plasma.

11. The method according to claim 8, wherein said mechanism for generating a plasma is of a RIE (Reactive Ion Etching) type, in which a high frequency power for generating a plasma is applied to one electrode holding said target object.

12. The method according to claim 10, wherein said mechanism for generating a plasma is of a type, in which different high frequency powers for generating a plasma are applied to both of said electrodes.

13. The method according to claim 11, wherein the etching is performed a magnetic field perpendicular to

the electric field in the space between said electrodes.

14. The method according to claim 10, wherein said magnetic field is formed by magnetic field forming means having a dipole ring magnetic in which a plurality of anisotropic segment magnets are arranged to form a ring such that the directions of the magnetization of said anisotropic segment magnets are controlled to form a uniform magnetic field of one direction between the pair of electrodes.

15. The method according to claim 9, wherein the etching selectivity of the oxide film relative to the shoulder portion of the mask pattern formed of a resist film is at least 5.

16. A method of etching an oxide film, which uses a RIE (Reactive Ion Etching) mechanism in which a process chamber can maintain a vacuum, a high-frequency electric filed is generated between a pair of opposing electrodes and high-frequency power is supplied to one of the electrodes, which holds an object, and in which the object with the oxide film formed on an upper surface is held, a plasma is generated in an atmosphere of an etching gas introduced into the process chamber, the oxide film formed on the object is etched in the plasma, and RIE is performed in the following conditions:

C_4F_6 and O_2 are applied at a total flow rate of 0.01 to 0.04 L/min;

C_4F_6 is applied in a ratio of 1.0 to 1.5 with respect to O_2;

a gas pressure of 1.3 to 26 Pa (10 to 200 mTorr) is maintained in the process chamber ranges during the etching; and

the plasma has a density of at least $3 \times 10^{10}/cm^3$, not exceeding $1 \times 10^{11}/cm^3$, during the etching.

17. A method of etching an oxide film, which uses a mechanism in which a high frequency electric filed is applied between opposing two electrodes provided in a process chamber maintained in a vacuum, thereby to supply high frequency power to both electrodes to generate a plasma, a high-frequency electric filed is generated between a pair of opposing electrodes and high-frequency power is supplied to both electrodes an object, and in which the object with the oxide film formed on an upper surface is held, a plasma is generated in an atmosphere of an etching gas introduced into the process chamber, the oxide film formed on the object is etched in the plasma, and RIE is performed in the following conditions:

C_4F_6 and O_2 are applied at a total flow rate of 0.03 to 0.1 L/min;

C_4F_6 is applied in a ratio of 0.7 to 1.1 with respect to O_2;

a gas pressure of 1.33 to 9.97 Pa (10 to 75 mTorr) is maintained in the process chamber ranges during the

etching; and

the plasma has a density of at least $5 \times 10^{10}/cm^3$, not exceeding $2 \times 10^{11}/cm^3$, during the etching.